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# A Survey of Rabbit Handling Methods Within the United Kingdom and the Republic of Ireland

James Andrew Oxley [a], Clare Frances Ellis[b], E. Anne McBride[c], and Wanda Denise McCormick[d]

[a]Independent Researcher, Measham, Swadlincote, United Kingdom; [b]Faculty of Arts, Science and Technology, University of Northampton, Northampton, United Kingdom; [c]Psychology, University of Southampton, Southampton, United Kingdom; [d]Animal Welfare & Equine, Moulton College, Moulton, United Kingdom

**ABSTRACT**

Rabbits are commonly kept in a variety of settings, including homes, laboratories, and veterinary clinics. Despite the popularity of keeping this prey species, little research has investigated current methods of handling. The aim of this study was to examine the experience of caregivers (owners and keepers) in using five handling methods commonly referred to in books written for companion animal (pet) owners and veterinary and/or laboratory personnel. An online survey was completed by 2644 respondents, representing all three of these groups, and breeders. Data were acquired to determine sources that participants used to gain knowledge of different handling methods, the methods they used and for what purposes they used them, and their perceptions of any associated difficulties or welfare concerns. Results indicated that participants most frequently used the method of supporting a rabbit's body against a person's chest, which was considered the easiest and most welfare-friendly method of the handling methods explored. "Scruffing with rear support" was the least used method and was considered to be distressing and painful for the rabbit. As rabbits are a terrestrial prey species, being picked up is likely an innately stressful experience. Additional research is encouraged to explore the experience of rabbits during handling to identify methods that can be easily used with the fewest welfare compromises.

**KEYWORDS**

Animal welfare; rabbit; handling; human–animal interactions; pets; veterinary; laboratory

## Introduction

The domestic rabbit (*Oryctolagus cuniculus*) is one of the few species commonly kept as companion animals (pets) who are also used for research and are farmed for their meat and fur. After the dog and cat, the rabbit is the third most common mammalian pet in the United Kingdom, numbering 0.8 million to 1.1 million (People's Dispensary for Sick Animals [PDSA], 2016; Pet Food Manufacturers Association, 2017). Rabbits are frequently used as laboratory models; in 2015 they were used in more than 14,000 experimental procedures in the United Kingdom (Home Office, 2016). The last 30 years have seen increasing research into the management and welfare of rabbits in the laboratory (e.g., Gunn & Morton, 1995; Lidfors, 1997; Verga, Luzi, & Carenzi, 2007). More recently, this research has extended to encompass pet rabbit caregiving and husbandry practices (e.g., Oxley, Previti, Alibrandi, Briefer, & Passantino, 2015; Rooney et al., 2014). Studies have highlighted the need for better understanding of the human–rabbit relationship and associated ownership practices

**CONTACT** James Andrew Oxley James_oxley1@hotmail.com 102 Bosworth Road, Measham, Swadlincote, DE12 7LQ, United Kingdom

Present affiliation of Wanda Denise McCormick is Biology, Anglia Ruskin University, Cambridge, United Kingdom.

Supplemental data for this article can be accessed here.

to facilitate the production of effective and informed education for caregivers, be they pets owners, laboratory or veterinary staff. The handling of rabbits is one such management area.

As rabbits are a terrestrial prey species, being picked up is likely an innately stressful experience for them (McBride, 2017). However, handling kept rabbits is important for several reasons, including health checking for sore hocks (pododermatitis) and myiasis (blowfly strike). Yet, Mancinelli, Keeble, Richardson, and Hedley (2014) found that 93.8% of 168 pet rabbits assessed showed signs of sore hocks (pododermatitis), suggesting owners either did not know to check the hocks or had difficulties in doing so. Despite the reason, the lack of health checks can be particularly fatal in summer months, when the risk for fly strike is heightened (Bisdorff & Wall, 2006). Though handling is potentially stressful, *"it is essential that owners of pet rabbits undertake twice-daily checks of their pet and are aware of the potential risks associated with faecal clumping and urine scalding*" (Druce, 2015, p. 202).

Research on rabbit handling has evaluated the effects on physiology such as mortality rate, weight gain (e.g., Jezierski & Konecka, 1996), and behavior (e.g., McBride et al., 2006; Swennes et al., 2011). For example, Swennes et al. (2011) suggested that handling rabbits (by scruffing and supporting the hind limbs) increases compliance in laboratory procedures and decreases human-directed fear in comparison with rabbits who are not handled. However, there are limitations in the body of research. Overall, the research has been restricted to rabbits on farms and in laboratories, whose experiences with human interactions have likely been very different from the experiences of pets. Further, the term handling is used broadly, specific methods are rarely stated or clearly described, and methods differ between studies. Rooney et al. (2014) also highlighted the lack of distinction in the literature between "lifting" and "handling." Lifting can be considered a specific state, when a rabbit's body is in the air and not in contact with any surface. The lack of definition can be extended to include the difference between "handling" and "restraint." "Handling" may be considered as referring to general interactions such as stroking or carrying, as opposed to "restraint," which is more specific, perhaps for a designated purpose. For example, laboratories may use specific restraint methods and, in some cases, unique restraint devices (Hrapkiewicz & Medina, 2013), while pet owners and/or vets may refer to specific restraint methods to groom or administer medication. In summary, the effects of handling methods on rabbits remain unclear, and clearer definitions and descriptions in the academic and applied literature are required. In this study, we defined handling as a generic term referring to the holding and support of a rabbit in a manner in which the rabbit can be static and does not include the picking up (from floor to holding position) or lowering of the rabbit. More specifically: 'Lifting' is defined as picking the nonhuman animal up from a surface/ground; 'holding' is defined as supporting the animal's weight off the ground/surface ; and 'restraint' is defined as restricting the animal's movement.

Numerous handling methods have been noted in pet, laboratory, and veterinary books, but there has been a lack of consistency across contexts in the terminology and regarding when these methods should be used (Oxley, Ellis, McBride, & McCormick, 2016). Furthermore, some methods are controversial including scruffing (Figure 1[e]), in which no or limited support is given to the rabbit's spine and legs (House Rabbit Society, n.d.; Rabbit Welfare Association and Fund [RWAF], 2007; Richardson & Keeble, 2014), and tonic immobility induced manually by a handler. Tonic immobility is a reflex defense response to a perceived extreme threat when there are no other escape options. Also known as "fright paralysis" (Gallup, 1974) or the "death feint" (Darwin, 1869), it is a temporary, reversible state of profound motor inhibition that causes an animal to go passive and appear dead. Tonic immobility reduces the interest of the predator/attacker, and can be induced in many species, including humans (Abrams, Nicholas Carleton, Taylor, & Asmundson, 2009; McBride, 2015). Although many do not recommend tonic immobility for pet rabbits (see, e.g., McBride, 2015; McBride et al., 2006; Oxley & Ellis, 2015; RWAF, n.d.; Richardson & Keeble, 2014), it is still recorded as being used in research, such as for assessing fear response (see Trocino, Majolini, Tazzoli, Filiou, & Xiccato, 2013; Zucca et al., 2012).

There is a surprising dearth of information about the welfare implications of different handling methods or how rabbit handlers perceive them. Therefore, the aim of this research was to explore the

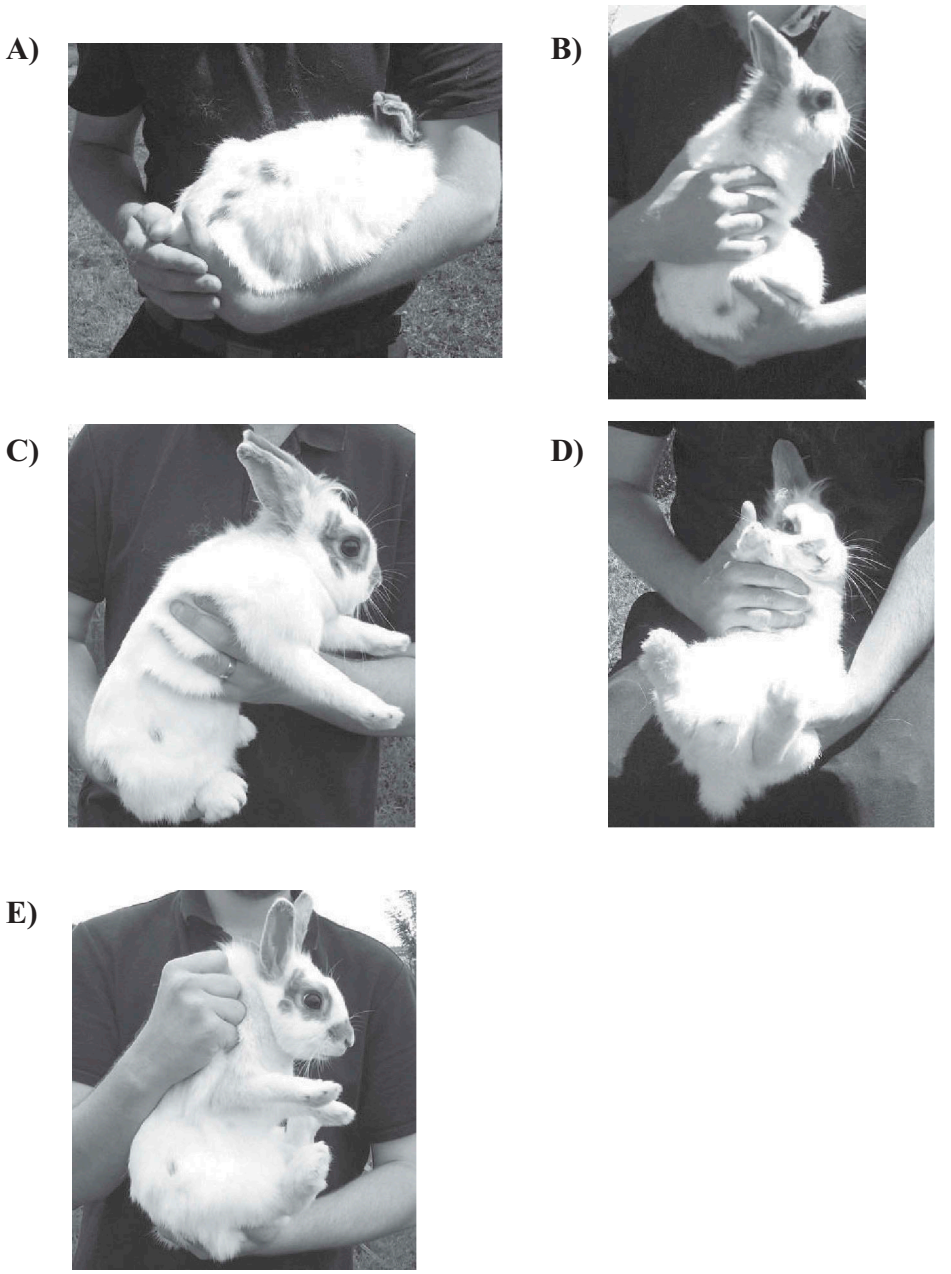


**Figure 1.** Common handling methods: (A) under arm, (B) against chest with hand on back, (C) in front of/against chest with hands/fingers separating front legs and supporting chest, (D) placed on back, (E) scruffing with rear support (Photographs taken by C. F. E. [Author 2]).

*Note*. ***Only*** the image was provided on the questionnaire.

experiences and perceptions of owners/handlers of pet, laboratory, and farm rabbits in using five handling methods commonly referred to in books written for these audiences. Data were acquired on sources participants have used to learn about rabbit handling, which methods they used and for what purposes they used them, and their perceptions of any associated difficulties or welfare concerns regarding all five methods.

## Method and materials

### Questionnaire design and distribution

The customized questionnaire was piloted to 10 individuals with varying rabbit experience (owners, animal care technicians, and a veterinarian). Ethics committees at the University of Southampton and Moulton College approved the final version of the questionnaire, which is available on request from the corresponding author. The questionnaire was hosted on SurveyMonkey. Participants were recruited through an advertisement and link distributed through social media (Facebook and Twitter) and an advertising flyer made available at an animal-related conference in the United Kingdom. Inclusion criteria, as stated in the first page of the questionnaire, were that respondents were 18 years of age or older, lived in the United Kingdom or Republic of Ireland, and previously or currently worked with or owned rabbits. Respondents had to indicate they met these criteria. Those who did not meet the criteria were automatically removed from the survey. Survey data were collected from October 19, 2015, to November 30, 2015.

The questionnaire included 70 questions in three sections. Potentially, participants answered fewer questions depending on their responses.

- Section 1: respondent demographics (age, gender, location)
- Section 2: participant experience and perception of five illustrated rabbit handling methods (see Figure 1[a–e])

For each method, an image was displayed and a filter question was asked—namely if the respondents had used the method illustrated and if not, why not. Respondents who had not used the method were then directed to the next handling method image. Those who had used the method continued to answer seven additional questions before progressing to the next method image.

Four questions concerned human experience: when the method was used (grooming, health check, moving, administering medication, other [open response]); how easy the participant found the method (measured on a four-point scale [very easy, easy, difficult, or very difficult]); information about any difficulties they encountered (two open questions); and how they felt about using the method (enjoy, neutral, or upsetting).

Three further questions investigated handler perception of the rabbit's experience with the method: whether the respondent considered the method stressful for the rabbit (measured on a five-point scale from 1 = not at all stressful to 5 = very stressful); how they felt the rabbit in the picture was feeling (anxious, fearful/scared, happy, sad, relaxed, calm, or other); and what in the picture made them come to this conclusion. Results from these questions will be reported in a later article (Oxley et al., in prep).

- Section 3: further information about the respondents' knowledge and experience of handling rabbits and sources used to acquire knowledge about handling methods

At the start of the survey, participants were briefed about the study aims and were informed that no personal details would be gathered. A consent statement was also provided. At the end of the questionnaire, a debriefing page gave details on where to obtain further information about rabbits/rabbit handling and the corresponding author's details if respondents wished to receive a summary of the findings.

### Handling methods

The five handling methods were chosen because they had been commonly referred to in books aimed at owners and veterinary and/or laboratory personnel (see Oxley et al., 2016). Books are an easily accessible source of information frequently used by pet owners (Edgar & Mullan, 2011). The

methods were illustrated by photographs in the survey (Figure 1). The same rabbit was used in each picture, and photographs were displayed in black and white to avoid any possibility of color influencing responses. No word description was provided for any of the pictures.

### Analysis

After removing incomplete surveys and respondents who reported to live outside the United Kingdom and Ireland, 2644 respondents were included in the analysis. Data were collected in Excel and coded for analysis. Descriptive statistics are reported in this study.

## Results

### Demographics

Table 1 displays a summary of demographic data. The majority of respondents were female (92.1%, $n$ = 2436) and were aged 21 to 49 years (80.4%, $n$ = 2123), while 8.2% ($n$ = 216) were younger than 21 years old and 11.1% ($n$ = 294) were 50 years or older; 90.3% ($n$ = 2387) stated they currently lived in England. The remainder lived in Scotland (4.6%), Wales (3.7%), Northern Ireland (0.8%), and the Republic of Ireland (0.6%).

### Ownership and experience

The sample represented a wide range of rabbit experience. Only 33.3% ($n$ = 882) had less than five years of experience. Many respondents (38.9%, $n$ = 1028) currently or had previously worked with rabbits in a variety of settings. Though rescue and veterinary settings accounted for 30% of these cases, others included working with rabbits in zoos/petting farms, pet shops, and laboratories. Most respondents currently owned or had owned pet or show rabbits (96.1%, $n$ = 2299), and of these, 83.2% ($n$ = 2199) stated they currently owned pet rabbits. Of these, a substantial proportion owned only one rabbit (28.7%, $n$ = 631), and the remainder owned multiple rabbits, most commonly two rabbits (41.9%, $n$ = 920; see Table 1).

### Handling methods

#### Frequency of use

Seven respondents were excluded from this part of the data set: Five reported issues with viewing the images for Method A ($n$ = 4) and Method C ($n$ = 1), noted as due to technological difficulties. Two respondents indicated they had used Method E but then provided responses suggesting the rabbits were dead at the time of handling.

Method B (86.2%, $n$ = 2278) was the most commonly used method across the sample. Methods A, C, and D were used with similar frequency (A = 63.6%, $n$ = 1678; C = 53.7%, $n$ = 1418; D = 59.9%, $n$ = 1583), and Method E was used noticeably less frequently (15.3%, $n$ = 403).

However, when looking at frequencies within a context, some variations were noticed (see Supplementary File 1). These variations related specifically to those respondents with laboratory experience who reported a higher use of Methods A and E compared with all other work and ownership categories. For laboratory workers, Method A was the most commonly used (86.8%) while Method B was the most commonly used in pet ownership and all other work contexts. Likewise, for this laboratory experience group, Method C (30.1%) was the least commonly reported, as opposed to Method E, which was consistently the least used method in all other contexts.

**Table 1.** Frequency counts and percentages for demographic and ownership/experience data.

| Question (*multiple responses possible) | Answer | *n* | % |
|---|---|---|---|
| In which country do you live now? | England | 2387 | 90.3 |
| | Scotland | 122 | 4.6 |
| | Wales | 98 | 3.7 |
| | Northern Ireland | 20 | 0.8 |
| | Republic of Ireland | 17 | 0.6 |
| What is your age? | 18–20 years | 216 | 8.2 |
| | 21–29 years | 975 | 36.9 |
| | 30–39 years | 689 | 26.1 |
| | 40–49 years | 459 | 17.3 |
| | 50–59 years | 246 | 9.3 |
| | 60 years and older | 48 | 1.8 |
| | Prefer not to say | 11 | 0.4 |
| Do currently you have pet rabbits of your own? | Yes | 2199 | 83.2 |
| | No | 445 | 16.8 |
| If yes, how many pet rabbits do you currently own? (*n* = 2199) | 1 | 631 | 28.7 |
| | 2 | 920 | 41.9 |
| | 3 | 205 | 9.3 |
| | 4 | 172 | 7.8 |
| | 5 | 62 | 2.8 |
| | 6 | 50 | 2.3 |
| | 7 | 25 | 1.1 |
| | More than 7 | 132 | 6.0 |
| | Missing | 2 | |
| Do you or have you owned pet or show rabbits? | No | 345 | 13.0 |
| | Pet rabbits | 2195 | 83.0 |
| | Both pet and show rabbits | 94 | 3.6 |
| | Show rabbits | 10 | 0.4 |
| Do you or have you worked with rabbits?* | No | 1616 | 61.1 |
| | Rescue center | 440 | 16.6 |
| | Veterinary practice | 349 | 13.2 |
| | Pet shop | 194 | 7.3 |
| | Zoo/petting | 145 | 5.4 |
| | Laboratory | 83 | 3.1 |
| | Rabbit breeder | 49 | 1.9 |
| | Education/teaching | 50 | 1.9 |
| | Boarding | 41 | 1.5 |
| | RSPCA inspector/animal collection officer | 3 | 0.1 |
| | Groomers | 2 | 0.07 |
| | Reiki/AAT | 2 | 0.07 |
| | Work at rabbit shows | 1 | 0.03 |
| | Meat farm | 1 | 0.03 |
| Approximately how many years of experience do you have with rabbits? | Less than 1 year | 114 | 4.3 |
| | 1–2 years | 297 | 11.2 |
| | 3–4 years | 471 | 17.8 |
| | 5–10 years | 844 | 31.9 |
| | 11–19 years | 499 | 18.9 |
| | 20 or more years | 419 | 15.8 |

*More than one option could be given. RSPCA = Royal Society for the Prevention of Cruelty to Animals; AAT = Animal Assisted Therapy.

### *Purpose of use*

Each method was used for various purposes (Figure 2 and Supplementary File 1). Across all ownership and work groups, moving the rabbit was the most commonly reported reason for handling, followed by health checks/administering medicine and grooming. A variety of "other"

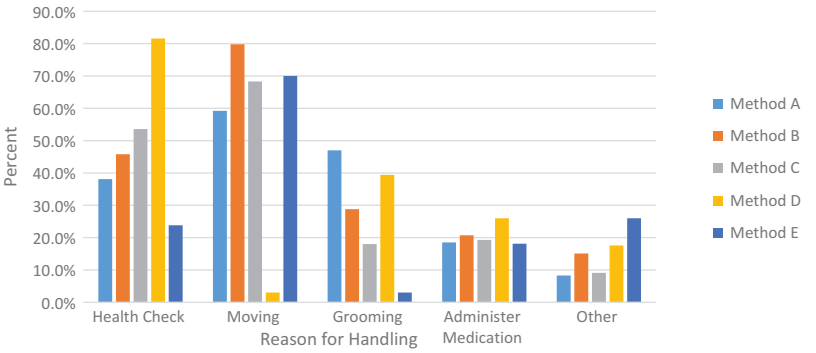


**Figure 2.** Reasons reported for using each of the five handling methods.

reasons were reported, including cuddling/petting (Method A, 5.4%, $n$ = 91; Method B, 10.9%, $n$ = 248), veterinary health procedures (Method D, 5.5%, $n$ = 87), and using a particular method for picking up a "difficult" rabbit or picking up a rabbit in an emergency (Method E, 16.1%, $n$ = 65).

Across the whole sample, moving was the most frequently reported reason given for using all methods (A = 59.5%, B = 80.2%, C = 68.3%, E = 70.5%) except Method D (3%). Method D was mainly used for health checking (82.2%), grooming (42.1%), and administering medicine (26.1%).

Cuddling and petting were reported infrequently as a reason for using each method and were not reported at all for Method E.

### *Reasons for not using each method*

Participants indicated why they did not use a method by choosing any of the four suggested reasons that were applicable (Table 2). The raw scores indicated this participant sample found Methods A and C to be the most unfamiliar or the most difficult to implement. While concerns regarding suitability were expressed for all methods, they were expressed substantially less often for Methods A ($n$ = 360) and B ($n$ = 226) compared with Methods C ($n$ = 767), D ($n$ = 751) and notably, E ($n$ = 1908). Respondents chose, "I was told never to use this method" for all five methods, but this response was chosen at least seven times more frequently for Methods D ($n$ = 273) and E ($n$ = 317).

An open response box of "other, please specify" provided additional data. The most frequent category emerging from these responses was "having had a negative experience, fear of the rabbit escaping, or risk for injury (to the person or rabbit)."

**Table 2.** Reasons given by respondents who did *not* use a method (more than one reason could be given).

| (Number of respondents) | Method A (962) | Method B (366) | Method C (1225) | Method D (1061) | Method E (2239) |
|---|---|---|---|---|---|
| Not familiar with this method | 423 (44.0%) | 53 (14.5%) | 317 (25.9%) | 114 (10.7%) | 153 (6.8%) |
| I find this method difficult | 133 (13.8%) | 59 (16.2%) | 169 (13.8%) | 81 (7.6%) | 92 (4.1%) |
| I do not feel this method is suitable | 360 (37.4%) | 226 (61.7%) | 767 (62.6%) | 751 (70.8%) | 1908 (85.2%) |
| I was told never to use this method | 29 (3.0%) | 16 (4.4%) | 39 (3.2%) | 273 (25.7%) | 317 (14.2%) |
| Other: | 134 (13.9%) | 42 (11.5%) | 92 (7.5%) | 122 (11.5%) | 241 (10.8%) |
| *Negative experience/risk for injury or escape (owner or rabbit)* | 46 (4.5%) | 15 (4.1%) | 34 (2.8%) | 71 (6.7%) | 87 (3.9%) |
| *Personal preference/methods not suited to breed/size/context* | 21 (2.2%) | 7 (1.9%) | 21 (1.7%) | 18 (1.7%) | 67 (3.0%) |
| *Variation of method used or needed* | 27 (2.8%) | 8 (2.1%) | 19 (1.5%) | 1 (0.1%) | 2 (0.9%) |
| *Not secure* | 5 (0.5%) | 1 (0.3%) | 7 (0.6%) | 8 (0.7%) | 4 (0.2%) |
| *I never handle my rabbits* | 12 (1.3%) | 3 (0.8%) | 2 (0.2%) | 2 (0.2%) | 0 |
| *Strong emotional reaction to method* | 1 (0.1%) | 1 (0.3%) | 0 | 11 (1.0%) | 80 (3.6%) |
| *Rabbit's preference for this position* | 0 | 2 (0.5%) | 6 (0.5%) | 9 (0.9%) | 1 (0.04%) |
| *Rabbit does not allow any handling* | 22 (2.3%) | 5 (1.4%) | 15 (1.2%) | 2 (0.2%) | 0 |

Methods D and E appeared to generate a negative emotional response. Eleven participants had a strong emotional reaction to Method D (rabbit on back), and they used words such as "wrong," "cruel," "dangerous," and "dreadful" . Even more respondents ($n$ = 80) used language indicating a significant negative reaction to Method E (scruffing) using the words "cruel," "distressing," "disgraceful," "horrible," "painful," and "uncaring."

### *Sources used to learn about rabbit handling*

The most frequently reported sources to learn about rabbit handling were books (40.2%), veterinary practices (40.0%), friends/family (37.4%), and specialist websites (rabbit forums). The least frequently used sources included breeders (8.7%), one's own experience (5.2%), and information websites of large animal charities, such as the Royal Society for the Prevention of Cruelty to Animals (RSPCA) or other rescue centers (0.1% and 0.9%, respectively). For further detail, see Supplementary File 2.

## Discussion

The aim of this study was to investigate the experience of owners and keepers in using five rabbit handling methods commonly referred to in books written for pet owners and veterinary and/or laboratory personnel. A customized questionnaire survey provided data concerning the reasons why different methods were or were not used, by whom they were used, and what sources were used to learn about rabbit handling. A large response rate was achieved; respondents represented individuals across the United Kingdom and the Republic of Ireland. Participants were owners and those working in a range of rabbit-related work contexts.

It was clear that rabbits are handled in a variety of ways for different reasons, which may vary across contexts (e.g., pet vs. laboratory). Although previous studies have indicated handling can be a negative experience for rabbits and should be avoided (Bradbury & Dickens, 2016; Rooney et al., 2014; Schepers, Koene, & Beerda, 2009), the wide range of reasons reported in this study suggests there is a need to handle rabbits, predominantly for moving them and for conducting health checks. It is encouraging to note that the majority of respondents recorded handling for health checking and many recorded handling for grooming procedures, both of which are activities that may have positive long-term health and welfare benefits for the rabbits as they enable health concerns to be identified early. Likewise, there was some indication that participants recognized that as prey animals, rabbits may find handling aversive (McBride, 2017). Few respondents described cuddling or petting as reasons for handling rabbits. This finding may reflect a recruitment bias, as the survey attracted people already interested in and knowledgeable about rabbit ethology and welfare. This explanation is further supported as only 28.7% of current pet owners kept singleton rabbits compared with 52% in the PDSA (2016) survey conducted six months after the present study. Similarly, in Australia, Howell, Mornement, and Bennett (2015) found that 63% of respondents surveyed owned only one rabbit.

Rabbit handling is a complex issue. The literature has shown conflicting views with regards to suitability of methods (Bradbury & Dickens, 2016). The current study confirms that this disparity is reflected in the perceptions of a large sample of people handling rabbits in different contexts. Rich data from open responses regarding why particular methods are not used suggest handlers consider the rabbit's experience, both emotional experience and experience regarding potential injuries, and the perceived preferences of the individual rabbits (Table 2). Methods were also described as ill-suited to specific breeds of rabbits. Rabbit breeds vary dramatically in size from miniature breeds (e.g., Polish at 1.1 kg) to giant breeds (e.g., Continental Giants at 7kg; British Rabbit Council, 2016). While medium and larger breeds are common in the laboratory and farm contexts, a range of different sizes of rabbits are kept as pets (Rooney et al., 2014). To the authors' knowledge, there has been no research investigating handling and breed differences. For example, larger rabbits may find some methods less supportive and more anxiety-inducing, and smaller breeds may be more susceptible to pain when handled. Future research might explore rabbit preference for different

handling methods and determine if there are breed differences. This research could enable the promotion of methods that encourage safe handling and reduce negative welfare impacts.

### Handling methods used

For all methods, except Method D, moving was the most frequently reported reason for handling a rabbit, even among pet owners. This finding may reflect increasing public understanding that rabbits generally find being handled a mildly aversive experience that can lead to struggling/aggressive responses (Rooney et al., 2014). However, there was a disparity across the handling methods and the different groups concerning familiarity with, perceived suitability of, and frequency of use. These differences may reflect the range of information sources and knowledge quality available to rabbit owners, as with other species (Roshier & McBride, 2012).

Method A was the least familiar method to the respondents, particularly pet owners, though it was the preferred method used by laboratory staff for moving rabbits (see Supplementary File 1). Method B was conceptually somewhat similar to Method A (rabbit held and supported close to body) and was the method most frequently used by pet owners. It is interesting to note that respondents recognized the difference in the full-body support provided by Methods A and B, compared with the subtly different Method C where the rabbit is held away from the person's body. Method C was far less frequently used and was considered by substantially more respondents to be unsuitable (see Table 2).

Very few respondents used Method D, placing a rabbit on its back, and it was usually used for health checks, grooming, and administering medication. Research has indicated that placing a rabbit on his or her back can induce a state of tonic immobility, which is stressful (Carli, Farabollini, & Di Prisco, 1979; Klemm, 1971; McBride et al., 2006). This method is not recommended for general use, with exceptions for specific purposes such as administering medication or clipping nails (Everitt, 2014). A large proportion of respondents regarded it as an unsuitable handling method, with 71% believing it would result in a negative experience for a rabbit. Although the image for Method D did not show a rabbit completely on its back, some respondents could have viewed it this way and some may have been aware that full inversion onto the back is not required to induce tonic immobility (McBride, 2015).

Method E, scruffing with rear support, was the least used method and was more commonly reported by those working in laboratories and breeding establishments.

Scruffing is a controversial method due to a perceived fear response in rabbits while being handled this way (Bradbury & Dickens, 2016), and the British Rabbit Council (n.d.) and RWAF (2007) advise against its use. Conversely, Swennes et al. (2011) reported that habituating rabbits to this scruffing method for three weeks resulted in more compliant behavior, which they interpreted as a reduced fear response. However, the current authors challenge this interpretation, as it is based on several unsubstantiated assumptions. The evaluation procedure used by Swennes et al (2011) involved a novel handler approaching the cage and offering fresh food before the rabbit was "*scruffed, corralled and removed from its cage*" (Swennes et al. 2011, p. 43) to another room. The rabbit was then stroked between his or her eyes, while his or her central ear artery was held to simulate blood collection. Part of the evaluation was to look for a flinch response to the initial touch at stroking. Evaluation was performed using a five-point compliance–resistance score measuring each rabbit's response to being scruffed and transported to and from the home cage and in respect to the rabbit's overall behavior. No information has been provided on rabbits' general previous experiences with human approach and feeding, which may block learning of less frequent approaches associated with scruffing (Kamin, 1969). More importantly, the suggestion that "compliance" equates with "reduced fear" does not account for any effect of learned helplessness (Maier & Seligman, 1976), tonic immobility (McBride, 2015), or stress-induced analgesia (Butler & Finn, 2009) and behavioral inhibition due to increased vigilance (McBride, 2017, 2017a).

Further research is needed to understand whether scruffing represents an actual welfare issue for rabbits or if the majority of rabbit handlers simply perceive it as a negative experience and why. Future research investigating the aversiveness of different handling methods must control for breed (size) differences and previous experiences of the individual rabbits used. It must also consider other challenges such as the confidence and/or experience of handlers, which may influence how rabbits respond to and experience handling (Mullan & Main, 2007).

Purposeful engendering of appetitive classical and operant associations to potentially fear-inducing human interactions through training has been promoted by many including McBride (2000, 2017) and Crowell-Davis (2007) for rabbits and other small prey species (Hurst & West, 2010). As for other species, early experiences are fundamental to later emotional resilience and behavior. Appropriate exposure of rabbit kits to handling during preweaning sensitive developmental (socialization) periods both before (Csatadi, Kustos, Eiben, Bilkó, & Altbäcker, 2005; Pongrácz & Altbäcker, 1999) and after eye opening, during Days 10 to 20 postpartum (Der Weduwen & McBride, 1999), can have profound beneficial consequences on responses to people in later life. To prevent the mother cannibalizing or abandoning the young, early handling is best done after their eyes open, around Day 10. Scent profiles should be preserved by rubbing hands with the nest material before touching the young and also by stroking the mother (Magnus & McBride, in press).

Many of the reasons reported for handling may be resolved in other ways. For example, positive reinforcement can be used to train rabbits to enter a carry cage, and handlers can interact with rabbits at floor level rather than cuddling them while they are lifted and held (Bradbury & Dickens, 2016). Updating information sources and education campaigns to highlight alternatives should be directed at all groups of rabbit handlers.

### *Sources used to learn about rabbit handling*

Edgar and Mullan (2011) found prospective rabbit owners reported leaflets, pet shop staff, and books as the most commonly used sources for acquiring knowledge about rabbits. In the present study, respondents used books, veterinarians, friends/family, and online sources with comparable frequency. This difference may simply reflect a general increase during the last decade in using electronic media for information gathering and its increasing availability on portable devices such as smartphones. Regardless of the media, the quality of information available may vary across sources.

Method B (against chest) has frequently been described as an appropriate rabbit handling method in books aimed at pet owners and veterinary staff (Oxley et al., 2016), and it was also the most commonly used method reported in this study. This finding suggests that the information provided via different media is reflected in real-world practices when it comes to rabbit handling methods.

## Conclusions

In conclusion, it is evident from this study that a variety of methods are used to handle rabbits for common husbandry activities and they can differ within different settings. Although only five handling methods were explored and alternatives methods also are likely to be used, this study shed some light on the reasons why people handle rabbits and the concerns they may have about different methods.

Handling of rabbits is likely to have a direct impact on rabbit welfare. Negative impacts on rabbits can be minimized by handling them in an appropriate way, including avoiding methods with a high potential to impede welfare, such as tonic immobility and scruffing. Additional research is encouraged to explore the experience of rabbits during handling and to identify the methods that may make handling easier for the handler and reduce any perceived and actual negative experience for the rabbit.

Future research that identifies preferable rabbit handling methods should ensure that the findings are disseminated in a way that will reach rabbit handlers (pet owners and those in work settings).

While books and veterinary practices are frequently used sources, information needs to be consistent and available across a wide range of media if it is to significantly influence the handling methods used and thus the welfare of rabbits.

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## ORCID

James Andrew Oxley http://orcid.org/0000-0001-9483-9795

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